Handling ROS Tutorial

Introductory tutorial to ROS and its use for robot in-hand manipulation

List of Topics

- ROS Introduction and Case-Study demonstration.
- Motion planning capabilities.
- Grasp planning and integration with GraspIt!
- Visual Perception System within HANDLE EU project using ROS.
- Managing coordinate frames with ROS.
- Control of the Shadow Dexterous Hand using ROS.
- Hand configuration perception with distributed sensors using ROS
- Grasp and Motion Planning with Underwater Intervention Vehicles running ROS: the experience of TRIDENT EU project.
- Adapting the manipulation stack to in-hand manipulation.

Tutorial registration via http://www.iros2012.org

Organizers:
- Jorge Dias, University of Coimbra
- Jorge Lobo, University of Coimbra
- Pedro Trindade, ISR - University of Coimbra
- Veronique Perdereau, Université Pierre et Marie Curie

Also visit http://mrl.isr.uc.pt/events/iros2012tutorial/ for more details and updates for this tutorial.
Handling ROS Tutorial

This tutorial provides a hands-on introduction to ROS - Robotic Operating System - and its use for robot in-hand manipulation.

ROS has been emerging as a standard for robot software development. It is an open-source, meta-operating system that provides hardware abstraction services. It implements low and high level functionality components addressing robot perception, control and planning, focusing on the modularity and reusability of code contributed by a growing user community.

ROS is designed to be as thin as possible, with no wrapping of user code so that it can be used with other robot software frameworks. The preferred development model is to have ROS independent libraries with clean interfaces. It is language independent, easy to use and scalable to large runtime systems and processes.

The speakers at the tutorial are researchers that are currently working on in-hand manipulation and using ROS for their work, providing practical case studies and examples, and bringing along some hardware to showcase and eventually test the attendees’ tutorial code.

As an outcome of this tutorial, attendees will have a basic knowledge on how to use ROS for manipulation, experience practical cases related with perception and action for robotic in-hand object manipulation, and also have a good insight on how ROS can be used as a software development tool in the context of a robotics research team.

The speakers are currently using ROS for research and development on autonomy and dexterity with robot hands for manipulation and grasping. Many of those activities are supported by international projects (e.g. European project HANDLE - Developmental pathway towards autonomy and dexterity in robot in-hand). ROS was a natural choice for the integrated work in the robotic in-hand object manipulation system, integrating perception using the Kinect sensor and tactile sensing, and control of the robotic arm and the SHADOW robotic hand.

Schedule

| Time     | Section Type | Speaker, Title                                                                 
|----------|--------------|-------------------------------------------------------------------------------
| 09:00 - 09:05 | Talk #1       | Jorge Dias / Jorge Lobo / Pedro Trindade / Véronique Perdereau, Welcome Session |
| 09:05 - 09:30 | Talk #2       | Matei Ciocarlie / Sachin Chitta, ROS Introduction                            |
| 09:30 - 10:30 | Talk #3       | Matei Ciocarlie / Sachin Chitta, Manipulation & Grasping - Part I              |
| 11:00 - 12:00 | Talk #3       | Matei Ciocarlie / Sachin Chitta, Manipulation & Grasping - Part II             |
| 12:00 - 12:30 | Hands-on #1   | Silvia Rodríguez-Jiménez, Visual Perception System within HANDLE EU project using ROS |
| 14:00 - 14:30 | Hands-on #2   | João Bimbo, Managing coordinate frames with ROS                              |
| 14:30 - 15:00 | Hands-on #3   | Toni Oliver, Control of the Shadow Dexterous Hand using ROS                   |
| 15:00 - 15:30 | Hands-on #4   | Pedro Trindade, Hand configuration perception with distributed sensors using ROS |
| 15:30 - 16:15 | Hands-on #5   | Mario Prats, Grasp and Motion Planning with Underwater Intervention Vehicles running ROS: the experience of TRIDENT EU project |
| 16:45 - 17:30 | Hands-on #6   | Guillaume Walck, Adapting the manipulation stack to in-hand manipulation       |
| 17:30 - 17:45 | Closing       | Jorge Dias / Jorge Lobo / Pedro Trindade / Véronique Perdereau, Concluding remarks and Tutorial Closing |

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